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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,861	04/05/2001	Toshihide Nabatame	501.39983X00	6498

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EXAMINER

KENNEDY, JENNIFER M

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicant(s)

09/806,861

Applicant(s)

NABATAME ET AL.

Examiner

Jennifer M. Kennedy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5,8,12 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,8,12,15-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 14.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

In view of Applicants' arguments and the amendment to the claims, the rejections of claims under 35 U.S.C. 112 second paragraph, as being indefinite, are withdrawn.

Applicants' arguments with regard to the combination of Kotecki et al. in view of Hicks are moot in view of Applicants' amendments to the claims.

Applicants are referred to the new ground of rejection given below.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5 (with respect to claim 1 and 2), 8 (with respect to 1 and 2), 12, and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dornfest et al. (U.S. Patent No. 6,358,810) in view of Hicks et al. (U.S. Patent No. 5,130,172).

Dornfest et al. discloses the method of forming a semiconductor device having a dielectric capacitor including a bottom electrode (54, 56, 58, 60), a dielectric layer (62) and a top electrode (64) on an underlying substrate having a three-dimensional structure, comprising providing a substrate having an insulation layer (51) provided thereon, the insulation layer having a hole formed therein, forming a bottom electrode

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(54, 56, 58, 60) comprising Ru or RuO<sub>2</sub> or a mixture of Ru and RuO<sub>2</sub> on at least a side wall of the insulation layer in the hole, providing a dielectric layer (62) on the bottom electrode and forming a top electrode (64) on the dielectric layer (see Figure 3, 4 and column 8, lines 5-25).

Dornfest et al. does not disclose the method of forming a top and bottom electrode by a metalorganic chemical vapor deposition process at 180-250 °C using a cyclopentadienyl complex as a precursor.

Hicks discloses the method of forming a top and bottom electrode of Ru or Pt by a metalorganic chemical vapor deposition process at 180-250 °C using a cyclopentadienyl complex as a precursor, wherein one H<sub>2</sub> is used as the reaction gas (see column 3, line 20-45, and column 4, line 60 through column 5, line 5, Example 1 and claim 1), and wherein the cyclopentadienyl complex is dissolved in toluene (column 7, line 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the electrode layers of Dornfest et al. by the method of Hicks in order to form thin layers (see Hicks, column 1, lines 15-20).

Dornfest et al. also discloses the method wherein the bottom electrode is formed homogeneously on the side wall of the insulation layer in the hole and on the bottom of the bottom of the hole (see Figure 3), and wherein the aspect ratio of depth/diameter of 3 or more (see column 8, lines 5-25).

Hicks et al. does not specifically disclose the solubility of the precursor in the solvent is 0.05 moles per liter or more, however the examiner believes this is inherent since Hicks discloses a precursor of bis cyclopentadienyl ruthenium (see column 4 lines

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1-68 and claim 1) and the solvent is toluene and the same temperature conditions are maintained as that disclosed in the specification. The specification states that bis cyclopentadienyl ruthenium in a solvent of toluene has a solubility of above 0.05 moles per liter (see specification page 12).

Dornfest et al. and Hicks et al. do not explicitly disclose the volume ratio of the reaction gas to the carrier gas. The selection of the volume ratio of the gases is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980) (discovery of optimum value of result effective variable in a known process is obvious).

The examiner maintains that the above statement with case law is sufficient for a 103 rejection, and that no further evidence is required.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dornfest et al. (U.S. Patent No. 6,358,810) and Hicks et al. (U.S. Patent No. 5,130,172) in view of Park et al. (U.S. Patent No. 6,001,660).

Dornfest et al. and Hicks et al. do not disclose the method of forming the dielectric layer by an MOCVD process. Dornfest et al. discloses the method of utilizing a PVD process to form the dielectric material (BST). Park et al. discloses the method of utilizing a either a sputtering technique or a MOCVD process to form a dielectric layer. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to form the dielectric layer by an MOCVD process rather than a PVD such as sputtering since as Park et al. teaches the two methods are interchangeable, further MOCVD films are highly conformal.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (703) 308-6171. The examiner can normally be reached on Mon.-Fri. 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers


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for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

*gmw*

jmk  
July 23, 2003

  
John F. Niebling  
Supervisory Patent Examiner  
Technology Center 2800